IPCC OPeNDAP Server

How to access the IPCC AR4 database via the OpenDAP server.
The PCMDI IPCC AR4 model output database contains a large collection of data generated by various modeling groups in support of the 4th Assessment Report. This data is accessible as data files from the IPCC model output portal, and as aggregate datasets from an OPeNDAP server.

OPeNDAP is a software framework that allows access to remote scientific datasets. The core of OPeNDAP is a specification of an http−based protocol that describes how clients and servers should communicate data over the network. There are a variety of clients and servers available that understand DAP; an adaptation of the PyDAP server is being used for the IPCC AR4 model output database.

The server provides access to IPCC datasets. A *dataset* is an aggregation of a set of related data files into a single virtual file. In general, a dataset consists of all data variables for a given combination of model, scenario, experimental run, temporal frequency, and submodel (ocean or atmosphere). A dataset is represented by a CDMS XML file.

Be aware that there is a definite overhead to accessing data through the OPeNDAP server. Network speed, HTTP protocol, and server delays combine to limit access speed in comparison to direct disk reads. If you plan to access very large amounts of data, or to use the same data repeatedly, it may be more cost−efficient to download the relevant files to your local machine through the portal. Also, because a dataset may consist of many hundreds of GBs of data, there are server−imposed limits on the size of access requests (see Accessing IPCC AR4 data through CDMS).

Using a Web Browser to view the IPCC AR4 Portal

- To use the DAP server to view the directory structure, you will need an IPCC portal user account. (Note: The directory can also be browsed here without a user account. However, the DAP server provides additional information.)
- Start at the top level of the IPCC directory, entering your username and password. You will see a listing of the database scenarios. Click on one of the directories to see which models are represented for that scenario, for example, the NCAR CCSM3 model. Clicking on the model directory gives a listing of the datasets available for that model and scenario. The dataset name is structured as:

  ```
  pcmdi.ipcc4.<model>.<scenario>.<run>.<submodel>.<frequency>.xml
  ```

  For example, data for the NCAR CCSM3 model, Climate of the 20th Century scenario, run 6, monthly atmospheric data is in dataset:

  ```
  pcmdi.ipcc4.ncar_ccsm3_0.20c3m.run6.atm.mo.xml
  ```

  See the portal ftp site description for explanation of the various descriptors.
- Click on one of the DDS (Dataset Descriptor Structure) links to see a structured list of the variables, datatypes, and coordinate structure of the dataset.
- The DAS (Dataset Attribute Structure) link shows the variables and attributes in the dataset.
- Clicking on the dataset name itself brings up a form that can be used to access data in ASCII form. (Note: at current writing this form does not work correctly.)

Accessing IPCC AR4 data through CDMS

- IPCC datasets may be accessed through the CDAT cdms module, provided that CDAT has been compiled with the opendap client libraries. The form of the open call is:

  ```
  f=cdms.open('http://username:password@climate.llnl.gov/dap/ipcc4/<scenario>/<model>/<datas
  ```

  For example:

  ```
  f=cdms.open('http://username:password@climate.llnl.gov/dap/ipcc4/20c3m/ncar_ccsm3_0/pcmdi.
  ```

- Once opened, an OPeNDAP dataset can be accessed in the normal CDMS fashion. However, since some of the datasets are very large – 100s of GB – there is a limit on the amount of data that can be accessed through a single operation. The limit is currently set to 64MB, but may change in the future. There is no limit on the number of data accesses that can be made in a single session.